

Barbecue grills should never be operated indoors or in an enclosed space such as a garage — even with the door open.

Check fireplaces for closed, blocked or bent flues, soot and debris. When operating a fireplace and a furnace at the same time, experts recommend opening a window slightly to make sure there is adequate fresh air for combustion and so gasses including CO will flow safely up and out the chimney.

Check the clothes dryer vent opening outside the house to be sure it's free of any blockage such as lint or debris.

# **First Alert**<sup>®</sup>

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Inadequate air supply in a room where two or more combustion appliances share the same air source, such as a water heater and furnace in a utility closet, can create another form of downdrafting called reverse stacking.

This occurs when one appliance, such as the furnace, turns on and is unable to get adequate fresh air. When the furnace operates, it then draws contaminated air from the water heater exhaust and spreads polluted air throughout the house.

A sticking thermostat can keep the furnace running continually, depleting the oxygen supply inside the house. This can lead to downdrafting.

In multiple family dwellings where living spaces share walls and pipes, carbon monoxide from one unit may enter a neighboring space through floor boards, cracks or underneath doors.

Car exhaust, which contains carbon monoxide, can quickly enter the home when a car is left idling in an attached garage... even if the garage door is left open.



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# *Carbon Monoxide*

***What you need to know about the leading  
cause of poisoning deaths in America***

# **Checklist:** *Where to look for problem sources of carbon monoxide in the home*

An improperly installed or malfunctioning forced air furnace could be the source of CO and should be carefully inspected by a professional.

- Measure the amount of CO in the flue gases.
- Check furnace connections to flue pipes, chimneys and venting systems for signs of corrosion, blockages, rust, gaps or holes.
- Check furnace filters and filtering systems for dirt or blockages.
- Check forced air fans for proper installation and correct air flow of flue gases. Improper furnace blower installation can result in carbon monoxide build-up because toxic gas is blown into rather than out of the house.
- Check the combustion chamber and internal heat exchanger for cracks, metal fatigue or corrosion — be sure they are clean and free of debris.
- Check burners and ignition system. A flame that is mostly yellow in color in natural gas-fired furnaces is often a sign fuel is not burning completely and higher levels of carbon monoxide are being released. Remember, you can't smell carbon monoxide.

Check all venting systems to the outside, including flues and chimneys for cracks, corrosion, holes, debris or blockages. Animals and birds can build nests in chimneys, preventing gases from escaping.

Check any other appliances that use flammable fuels such as natural gas, oil, wood, propane, coal or kerosene.

- Appliances include gas water heaters, clothes dryers, kitchen ranges, ovens or cooktops, wood or coal burning stoves, gas refrigerators or pressure washing machines or generators.
- Pilot lights can be a source of carbon monoxide because the by-products of combustion are released inside the home rather than vented to the outside. Gas ovens and ranges should be monitored closely and kept in good working order, and should never be used to heat a residence.

Be sure space heaters are vented properly. Unvented space heaters that run on flammable fuel can release carbon monoxide into the home.

## ***If initial testing does not confirm the presence of carbon monoxide, there may be several reasons:***

Testing equipment used to measure the presence of carbon monoxide in the air must be calibrated to monitor low levels of carbon monoxide.

- Some detection devices only measure concentrations of 1,000 parts per million and higher, significantly above safe levels. Testing equipment should be capable of sensing levels as low as one part per million. For example, the Underwriters Laboratories Inc. standard for residential carbon monoxide detectors require the detectors to sound a full alarm before 90 minutes of exposure to 100 parts per million of carbon monoxide.
- If initial readings don't reveal sufficient concentrations of carbon monoxide to set off an alarm, testing equipment called dataloggers can be used to monitor indoor air conditions over time.

After an alarm activates, if appliances are turned off and doors or windows are left open to bring in fresh air and ventilate the home, carbon monoxide levels will quickly dissipate. This creates a lower reading than the level that originally triggered the alarm.

- To help assure proper measurement, carbon monoxide readings should be conducted as soon as possible after an alarm incident. Investigators also should close up the residence and attempt to recreate conditions that occurred before the alarm went off.

If appliances, flues and chimneys are confirmed to be in good working order, the source of carbon monoxide leaks may be from downdrafting or a car that was left running in an attached garage.

Downdrafting occurs primarily in more energy-efficient, "airtight" homes. Combustion gases normally vent to the outside through flues and chimneys. When exhaust fans in the kitchen or bathroom are operated, large quantities of air is pumped outdoors. This can cause air pressure outside an airtight home to become greater than inside, sending fresh air rushing down the flue or chimney. This prevents flue gases from exiting the house.

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## ***What is carbon monoxide and who is at risk?***

Carbon monoxide (CO) is a colorless, odorless, deadly gas. Because you can't see, taste or smell it, carbon monoxide can kill you before you know it's there. At lower levels of exposure, carbon monoxide causes health problems.

Everyone is at risk for carbon monoxide poisoning. Medical experts believe, however, that some individuals are more vulnerable to poisoning such as unborn babies, infants, children, senior citizens and people with heart or lung problems.

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## ***Why is carbon monoxide so dangerous?***

The great danger of carbon monoxide is its attraction to hemoglobin in the bloodstream, which normally carries life-giving oxygen to cells and tissues. As even small amounts are breathed in, carbon monoxide quickly bonds with hemoglobin in the blood, displacing the oxygen that organs need to function.

When CO is present in the air, it rapidly accumulates in the blood, forming a toxic compound known as carboxyhemoglobin (COHb). Carboxyhemoglobin causes symptoms similar to the flu, such as headaches, fatigue, nausea, dizzy spells, confusion and irritability. As levels of COHb increase, vomiting, loss of consciousness and eventually brain damage or death can result.

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## ***Where does carbon monoxide come from?***

Carbon monoxide is a common by-product of combustion, present whenever fossil fuels are burned. It is produced by malfunctioning or unvented home appliances such as gas or oil furnaces, clothes dryers, ranges, ovens, water heaters, space heaters, fireplaces, charcoal grills and wood burning stoves. Fumes from automobiles also contain high levels of carbon monoxide that can enter a home through walls or doorways if a car is left running in an attached garage. All of these sources can contribute to a CO problem in the home.

If a home is vented properly and is free from appliance malfunctions, air pressure fluctuations or venting and chimney blockages, carbon monoxide is usually vented safely to the outside. However, insulation meant to keep indoor air warm during the winter or cool in the summer can help trap CO-polluted air in the home. Additionally, furnace heat exchangers can crack or vents and chimneys can become blocked. If there is an inadequate indoor fresh air supply for combustion, airflow in flues and chimneys may reverse direction causing a downdraft, which traps combustion gases in the home.

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## ***How can I protect myself and my family from carbon monoxide poisoning?***

The Consumer Product Safety Commission (CPSC) recommends installing at least one carbon monoxide detector with an audible alarm near the sleeping area. If a home has multiple floors a detector on every level provides extra protection. Choose an Underwriters Laboratories Inc. (UL Inc.) listed detector that sounds an audible alarm.

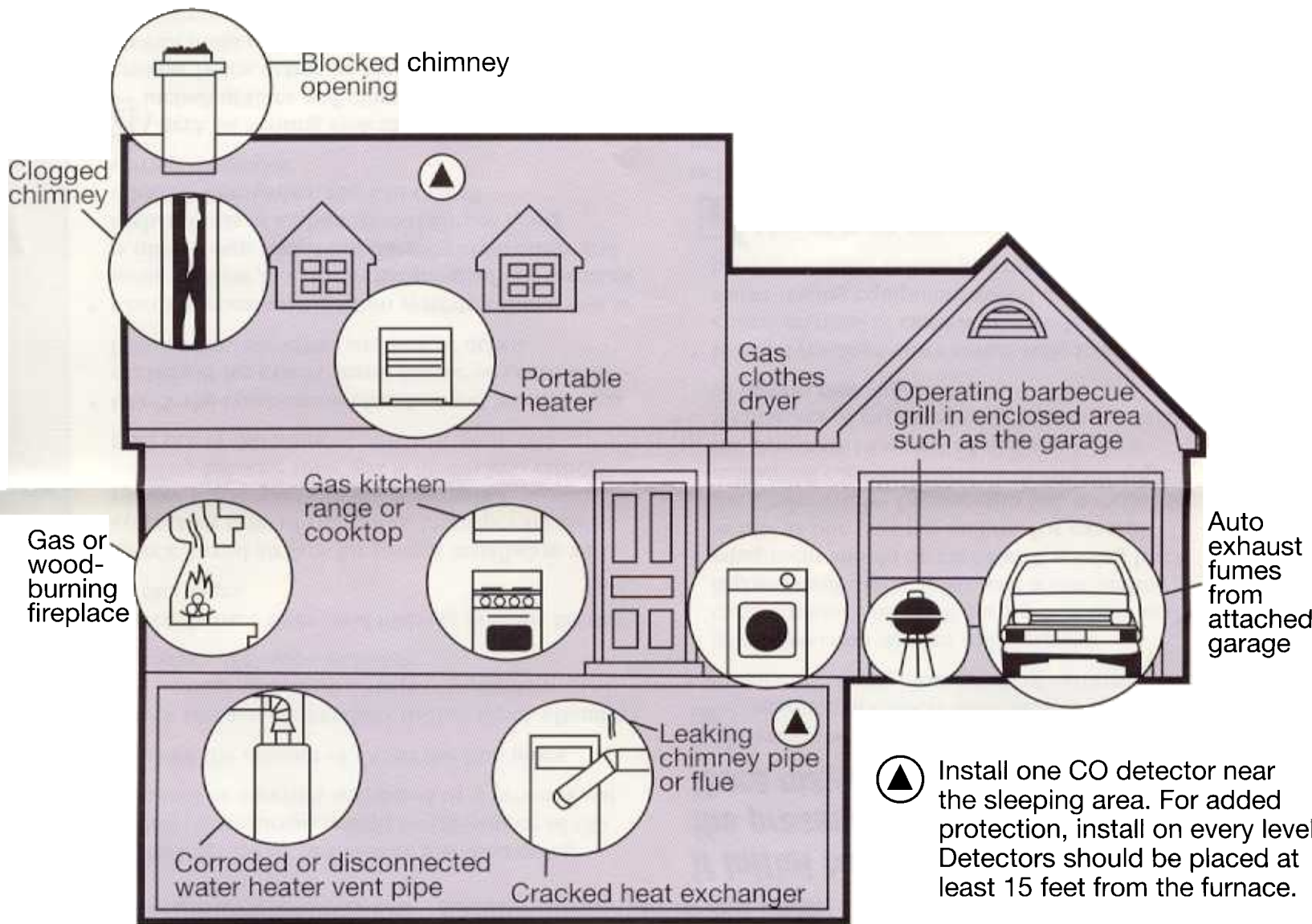
First Alert, the leading brand name in home safety, offers an Extra Sensitive carbon monoxide detector that warns at carbon monoxide levels plug-in models are not designed to detect. This model is battery operated so it continues to protect even in the event of a power outage. The First Alert model uses patented bio-sensor technology, which simulates the body's response to CO. A hardwired AC model with battery back-up is also available.

Plug-in models which fit a standard electrical outlet, including one with a digital display read-out of CO levels, are also available from First Alert. All First Alert carbon monoxide detectors are UL listed.

In addition to installing carbon monoxide detectors as a first line of defense, consumers should have a qualified professional check all fuel burning appliances, furnaces, venting and chimney systems at least once a year or as recommended by the manufacturer.



# Potential Carbon Monoxide Sources in the Home



Information provided by First Alert

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